SNS COLLEGE OF TECHNOLOGY

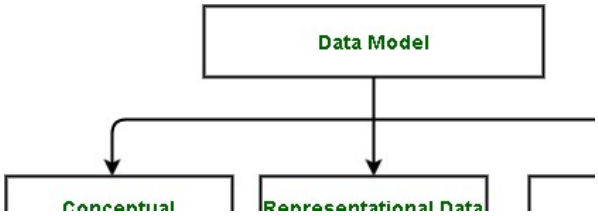
(An Autonomous Institution)
Coimbatore – 641 035.
B.E / B.Tech – Internal Assessment Exam- I
Academic Year 2023-2024 (EVEN)
Fourth Semester (Regulation R2019)
19CST202 – Database Management Systems
Answer key for SET A

PART A — (5 x 2 = 10 Marks)

1. **State the levels of abstraction in a DBMS.**
   The three levels of abstraction in DBMS are:
   - External Level / View Level
   - Conceptual Level/ Logical Level
   - Internal Level / Physical Level
2. **Compare database systems with file systems**

Basis	File System	DBMS
Structure	The file system is software that manages and organizes the files in a storage medium within a computer.	DBMS is software for managing the database.
Data Redundancy	Redundant data can be present in a file system.	In DBMS there is no redundant data.
Backup and Recovery	It doesn't provide backup and recovery of data if it is lost.	It provides backup and recovery of data even if it is lost.
Query processing	There is no efficient query processing in the file system.	Efficient query processing is there in DBMS.
Consistency	There is less data consistency in the file system.	There is more data consistency because of the process of normalization.

3. **Describe data model and list the types of data model used**
   A Data Model in Database Management System (DBMS) is the concept of tools that are developed to summarize the description of the database. Data Models provide us with a transparent picture of data which helps us in creating an actual database.



4. **Define the term Cardinality**

Cardinality represents the number of times an entity of an entity set participates in a relationship set. Or we can say that the cardinality of a relationship is the number of tuples (rows) in a relationship. Types of cardinality in between tables are:

- one-to-one
- one-to-many
- many-to-one
- many-to-many

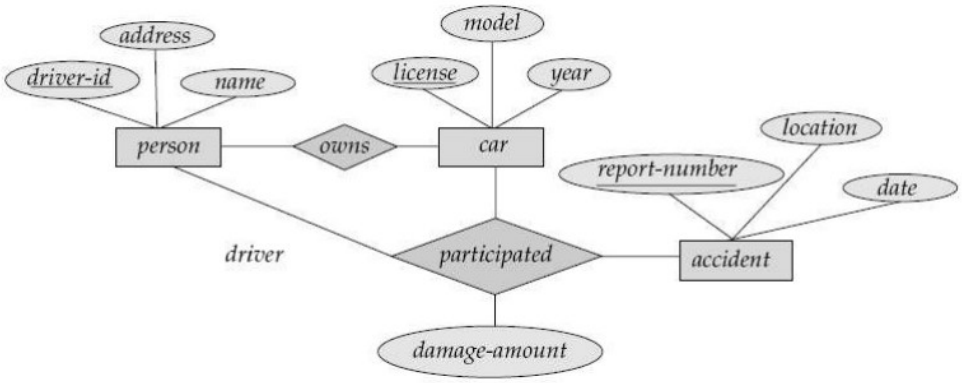
5. **State about PROJECT operation in Relational algebra?**

Project operation selects (or chooses) certain attributes discarding other attributes. The Project operation is also known as vertical partitioning since it partitions the relation or table vertically discarding other columns or attributes.

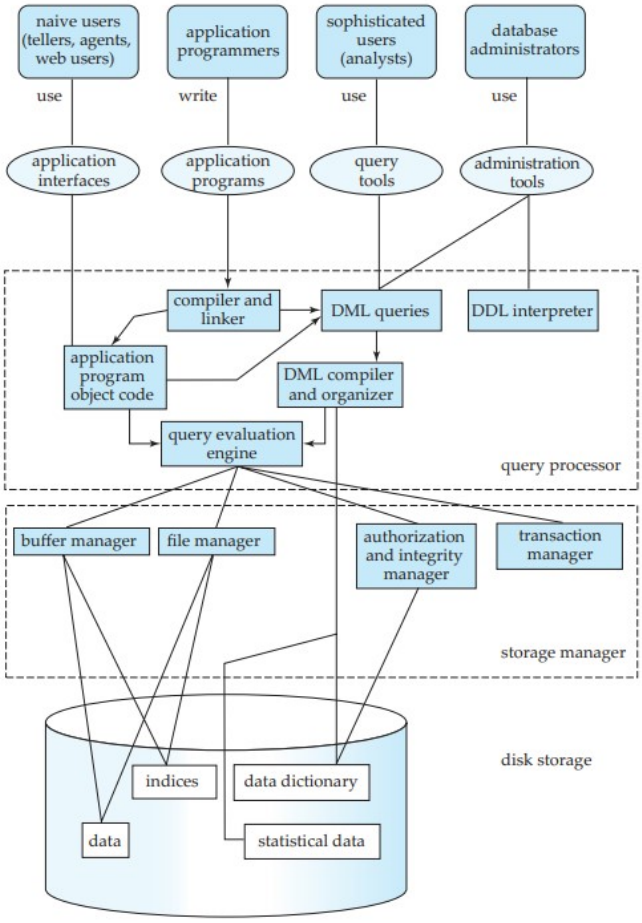
Notation: πA(R)

PART B — (2 x 13 = 26 Marks, 1x 14 = 14 Marks)

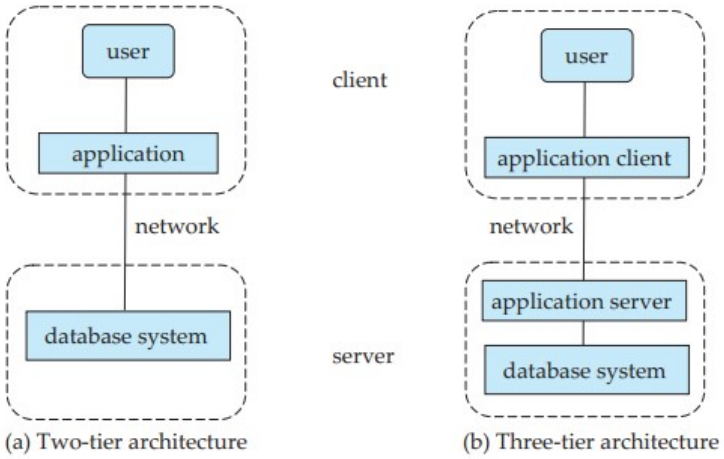
6.a. Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents



6.b. Explain the database system architecture with neat diagram?



Two-tier and three-tier architectures

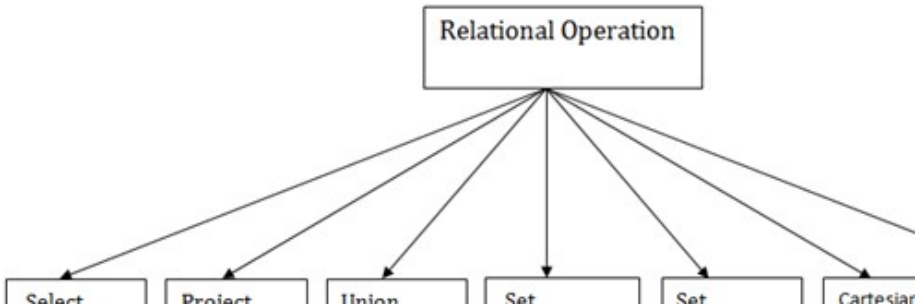


(a) Two-tier architecture (b) Three-tier architecture

7.a. Define relational algebra. Explain various relational algebraic operations with example

Relational algebra is a procedural query language. It gives a step-by-step process to obtain the result of the query. It uses operators to perform queries.

Types of Relational operation



7.b.Create a table for storing Student information of a particular College. Use DDL commands with proper syntax.

Data Definition Language is used to define the database structure or schema. DDL is also used to specify additional properties of the data. The storage structure and access methods used by the database system by a set of statements in a special type of DDL called a data storage and definition language. These statements define the implementation details of the database schema, which are usually hidden from the users. The data values stored in the database must satisfy certain consistency constraints.

Commands

CREATE: to create objects in database

ALTER: alters the structure of database

DROP: delete objects from database

RENAME: rename an objects

8.a Consider the following relational schema Employee (empno, name, office, age) Books (isbn, title, authors, publisher) Loan (empno, isbn, date) Write the following queries in relational algebra.

a. Find the names of employees who have borrowed a book Published by McGraw-Hill?

b. Find the names of employees who have borrowed all books Published by McGraw-Hill?

c. Find the names of employees who have borrowed more than five different books published by McGraw-Hill?

d. For each publisher, find the names of employees who have borrowed?

a. π_{name} (employee ⋈ (π_{empno} (Loan ⋈ (π_{isbn}(Б $_{publisher='McGrawHILL'}$ (books)))))
b. π name, isbn(employee ⋈ π_{empno} (loan ⋈books) ÷ π isbn(Б $_{publisher='McGrawHILL'}$ (books))
c. π name (employee ⋈ π_{empno} loan ⋈books (π isbn(Б $_{publisher='McGrawHILL'}$ $_{\wedge count(isbn)>5}$(books))
d. π name (employee ⋈ π_{empno} loan ⋈books (π isbn(Б$_{publisher='McGrawHILL'}$ $_{\wedge count(isbn)>5}$(books))

8.b Let E1 and E2 be two entities in an E/R diagram with simple single-valued attributes. R1 and R2 are two relationships between E1 and E2, where R1 is one to-many and R2 is many-to-many. R1 and R2 do not have any attributes of their own. Calculate the minimum number of tables required to represent this situation in the relational model?

Strong entities E1 and E2 are represented as separate tables. In addition to that many-to-many relationships(R2) must be converted as separate table by having primary keys of E1 and E2 as foreign keys. One-to-many relationship (R1) must be transferred to \'many\' side table(i.e. E2) by having primary key of one side(E1) as foreign key(this way we need not to make a separate table for R1). Let relation schema be E1(a1,a2) and E2(b1,b2). Relation E1(a1 is the key)

a1 a2

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1 3

2 4

3 4

Relation E2(b1 is the key, a1 is the foreign key, hence R1(one-many) relationship set satisfy here)

b1 b2 a1

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7 4 2

8 7 2

9 7 3

Relation R2 ({a1, b1} combined is the key here , representing many-many relationship R2)

a1 b1

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1 7

1 8

2 9

3 9

Hence, we will have minimum of 3 tables.